

Spring 2010
CRP 6220; Credit: 3 (not open for audit)
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Planning and Policy Analysis

Tuesday 8.40-11.25, 'New Seminar Room' 261B East Sibley; Lab: 11.25am-1.25pm.
Office Hour: Tue: 14.00 – 17.00, and by appointment
Office: 213 West Sibley Hall (255-4271)

Purpose and Contents

The course is designed to familiarize students with the essence of planning models and equip them with relevant analytical tools to undertake practical quantitative policy and planning analysis. The models to be discussed are of the economy-wide category, more specifically *social accounting matrix* (SAM), *structural path analysis* (SPA), and *computable general equilibrium* (CGE). The class emphasis is on how to build such models from scratch, understanding their properties, structure, and assumptions, and how to use them for planning and policy analysis capable of capturing the interactions between economic, social, environment and other indicators (e.g., production, income distribution poverty, pollution, migration). The intensive lab sessions are intended to guide students to use the specific software for building the models: *MATLAB* for SAM multiplier and SPA; and *GAMS* (General Algebraic Modelling System) for CGE. Subjects covered in class are basically cumulative in the sense that each topic is related to, or built upon, what was discussed before. Those who may not be able to attend the class and lab sessions fully should consider not taking the course. Class evaluation is heavily weighted by homework and final project.

Requirements

To understand fully the course contents, some background in macro and microeconomics is required. Prior knowledge of basic quantitative models and optimization is helpful, albeit not strictly required. Knowledge of calculus and matrix operations is also helpful.

Evaluation

Evaluation will be based on students' participation in lab, class discussions, exercises, a set of homework (50%), and a final project (50%). The latter should be based on actual case and data (to be announced in class). The basis of the evaluation is on the originality and complexity of the model used and the simulation analysis. The write-up should be concise, with clear policy implications.

Outline

I. Planning Models (week 1a)

- 1) Basic concept of Planning Models and their components: Target variables,

- policy variables, irrelevant variables and data
 - 2) Examples of Planning Models
 - 3) Reviews of I-O model: Basic framework, I-O multipliers,
 - 4) What is missing in I-O model
 - 5) The importance of interactions among economic, social, environment and other indicators
- II. Social Accounting Matrix (week 1B)**
- 1) SAM Framework
 - Data system
 - Analytical tools
 - 2) SAM multipliers (**week 2A**)
 - Comparison with I-O multipliers
 - Interregional SAM multipliers
- III. SAM applications for planning and policy analysis (week 2B)**
- 1) National planning and policy analysis
 - 2) Regional planning and policy analysis
 - 3) Interregional and international planning and policy analysis
- IV. SAM and Structural Path Analysis (week 3)**
- 1) Introduction to Structural Path Analysis (SPA)
 - Direct influence
 - Total influence
 - Global influence
 - 2) Examples and applications of SPA
 - National models
 - Regional models
- V. Introduction to CGE (week 4)**
- 1) Two-sector closed economy model
 - 2) Open economy model
- VI. CGE Model With Inter-industry (week 5)**
- VII. Application of CGE Model With Inter-industry (week 6)**
- VIII. Introduction to SAM-Based CGE (week 7)**
- 1) What is missing in SAM models
 - 2) Basic concept of CGE models
- IX. CGE models: calibration and estimation (week 8)**

S P R I N G B R E A K

- X. CGE Multiplier and Steps to Construct CGE Model (week 9)**
- Inclusion of Financial Sector:
- a) Flow-of-Fund
 - b) Financial SAM
- XI. CGE & FCGE Model (week 10)**
- How to link the financial sector and real sector in CGE
- XII. Model Simulations & Applications (week 11)**

XIII. More Model Applications (week 12)

XIV. Advances in CGE & FCGE Modeling (week 13)

e.g., Imperfect competition and labor migration

XV. Summary and Next Steps (week 14)

Lab Schedule

WEEK 1 – Input-Output

- Compute Input-Output Multipliers using Microsoft Excel
- Interpret Leontief and various types of Income Multipliers

WEEK 2 – Social Accounting Matrix (SAM)

- Compute SAM Multipliers in Microsoft Excel (1997 China SAM-67 rows and columns)
- Interpret SAM Multipliers

WEEK 3 – Structural Path Analysis (SPA)

- Compute SPA in MATLAB
- Interpret SPA and create a diagram from SPA results

WEEK 4 – Introduction to CGE

- Introduction to GAMS
- Write a simple CGE model (2 sectors, 2 inputs)

WEEK 5 – Input-Output Based CGE Model (part I)

- Write GAMS codes to read matrix
- Example using pollution tax CGE model

WEEK 6 – Input-Output Based CGE Model (part II)

- Write GAMS codes to import matrix and test the codes by exporting the matrix
- Example using aggregated China CGE model

WEEK 7 – Endogenous Price System and Calibration in CGE

- Learn and write various types of blocks: price, production, income, expenditure, and market clearing

WEEK 8 – Macro Closure & Model Simulation

- Learn how to use different model closures
- Write GAMS code and interpret the results

WEEK 9 – SAM Based CGE Model vs. SAM Analysis

- Run SAM and CGE model with the same exogenous shock
- Interpret the results and learn the difference between SAM and CGE multiplier

WEEK 10 – Equations in GAMS

- Given mathematical equations, learn how to write them in GAMS
- Construct complex CGE models in GAMS

WEEK 11 – Introduction to CFGE

- Difference between CGE and CFGE

WEEK 12 – CFGE (part I)

WEEK 13 – CFGE (part II)

WEEK 14 – CFGE (part III)

References

GAMS programs for some specific models will be distributed in class. The reading materials below are meant only for references. They are listed to help those who would seek clarifications or further explanations.

For Reviews on Input-Output, SAM Models and Structural Path Analysis

- 1) Input-Output Analysis: Foundations and Extensions, by R.E. Miller and P.D. Blair. Published in 1985 by Prentice-Hall. This is a good place to review input-output method
- 2) Interregional Input-Output Analysis of Asean-USA and Asean-Japan Interrelations, by Iwan Azis, in Jomo (ed), *Asean Economies: Crisis & Response*, published by MEA, Kuala Lumpur, 1985. The application of interregional IO model is shown in this paper
- 3) Planning Techniques for a Better Future, by Pyatt, G and E. Thorbecke, ILO, Geneva, 1976. This is an introduction to comprehensive planning models. It is an easy-to-read book on social accounting matrix.
- 4) Structural Path Analysis and Multiplier Decomposition Within A Social Accounting Matrix Framework, by Jacques Defourny and Erik Thorbecke, in *The Economic Journal*, 94 (March 1984), 111-136. The first part of this article presents the concept of SAM in a succinct way. The second part, on “structural path analysis,” shows further extensions of SAM.
- 5) Measuring Economy-wide Impacts of A Financial Shock, by Iwan J Azis & Yuri Mansury, in *ASEAN Economic Bulletin*, Volume 21, Number 2 (August, 2003). This paper demonstrates two things: (a) how financial sector is incorporated into SAM; and (2) how SAM multiplier and SPA can be applied to financial and social issues in a coherent and consistent manner.

For SAM and CGE Models and Applications

- 1) The Two-Sector General Equilibrium Model: A New Approach, by C. L. Dinwiddie & F.J Teal, Philip Allan/ St. Martin’s Press, 1988. This is an elementary book on the concept of CGE models. It is easy to read, even for those with no strong mathematical knowledge and economics background.
- 2) Quantitative Development Policy Analysis, by E. Sadoulet & Alain de Janvry, John Hopkins University Press, 1995. This is a relatively complete text book on policy modeling, including CGE modeling, although only few chapters are relevant for the class.
- 3) Cameroon General Equilibrium Model Using NLP. This model is a blueprint of a basic CGE model that follows closely the CGE model of Dervis, De Melo and Robinson in the late 1970s.
- 4) Macroeconomics, Financial Variables, and Computable General Equilibrium Models, by Sherman Robinson, *World Development*, 19(11), pp 1509-1525, 1991. This article shows how the financial sector is incorporated into a standard real-sector CGE model.
- 5) Simulating Economy-wide Models to Capture the Transition from Financial Crisis to Social Crisis, by Iwan Azis, *The Annals of Regional Science*, Vol. 34,

Issue 2, 2000. This article demonstrates the use of SPA and CGE models to measure the impact of a financial shock on income distribution.

- 6) Linking Pollution and Macroeconomic Variables, by Iwan J. Azis, in M. Chatterji & Yang Kaizhong (eds) *Regional Science in Developing Countries: Perspectives for the Future*, Macmillan and St Martin's Press, 1997. This is an example of the use of a CGE model using IO Table (without SAM) to analyze the tradeoffs between growth/efficiency and pollution/environment.
- 7) Applied General Interregional Equilibrium, by Walter Isard & Iwan Azis, in Walter Isard et.al, *Methods of Interregional and Regional Analysis*, Ashgate, England, 1999, pp 333-400. This provides various important issues of interregional CGE modeling with transportation costs and some possible extensions.
- 8) Development Performance and Future Scenarios in the Context of Sustainable Utilization of Natural Resources, by Iwan Azis and Emil Salim, in Budy, P.R (ed) *The Politics and Economics of Indonesia's Natural Resources*, Institute of Southeast Asian Studies, p 125-142. This shows the application of dynamic CGE model in the context of sustainable development.
- 9) A Drastic Reduction of Fuel Subsidies Confuses Ends and Means, by Iwan Azis, in *ASEAN Economic Bulletin*, April, 2006. This demonstrates the planning and policy analysis of fuel subsidy and domestic debt based on CFGE model
- 10) China's Urban-Rural Disparity Under Alternative Financial and Fiscal Policies, by Iwan Azis, Wing Thye Woo, Zhai Fan, and Chanin Manopiniwes, in *ICFAI Journal of Applied Economics*, May, 2006. This shows how CFGE model can be applied for planning and policy analysis in China's policy dilemma
- 11) The Relevance of Price Endogenous Models, by Iwan Azis, in *Regional Science Review*, Vol 17, 1998, p.1-20. This shows how a CGE model can be used to analyze economic reform, and it also shows the difference between SAM multiplier and CGE multiplier
- 12) A New Approach to Modeling the Impacts of Financial Crises on Income Distribution and Poverty, by Iwan Azis, *ADB Institute Research Paper*, No 35, March 2002. This is an application of Financial CGE Model for impact analysis.
- 13) Macroeconomic Policy and Poverty, by Iwan Azis *ADB Institute Discussion Paper*, No. 111, 2008, Tokyo-Japan. This is an application of Financial CGE Model combined with Aggregate Supply and Aggregate Demand model

Additional references may be required and announced in class. Each student is expected to abide by the Cornell University Code of Academic Integrity. Any work submitted by a student in this course for academic credit will be the student's own work. "In compliance with the Cornell University policy and equal access laws, I am available to discuss appropriate academic accommodations that may be required for students with disabilities. Requests for academic accommodations are to be made during the first three weeks of the semester, except for unusual circumstances, so arrangements can be made."